A Look into the Mind of the Modern Graduate Student via Telephonic Obfuscation

Erik Harpstead, Sauvik Das, Dan Tasse, Rebecca Gulotta, Felicia Ng, Siyan Zhao, Robert Xiao, Jennifer Olsen, Judith Odili Uchidiuno, Anhong Guo, Xiang 'Anthony' Chen, Adam Stankiewicz, Nick Diana, Anna Kasunic, Caitlin Tenison, Kenneth Holstein, Julian Ramos Rojas, Michael Madaio, Michael Rivera, Nesra Yannier, Adrian deFreitas, Qian Yang, Nikola Banovic, Mary Beth Kery, Steven Dang, Xu Wang, Fannie Liu, Kristin Williams, Brandon Taylor, Samantha Finkelstein, Alexandra To, David Gerritsen, Toby Li, Cole Gleason, Christopher MacLellan, Franceska Xhakaj, Alex Sciuto, Judeth Oden Choi, Fanglin Chen, Jeff Rzeszotarski, Rushil Khurana, Joseph Seering, Kerry Chang, Gierad Laput

Human-Computer Indoctrination Institute
Carnegie Mellon University
Pittsburgh, PA 15232

ABSTRACT

The modern graduate student has many diverse concerns on their mind including such highlights as: sustenance, self-image, popular culture, ideological proselytization, and the existential dread of contemplating the relativistic nature of truth. We, the members of the ACH special interest group on Computer Human Indoctrination, were interested in better understanding the vacuous depths of the graduate mind. We ~~subjected~~ introduced a population of graduates to a method first proposed by Borel (1913) and augmented it with a paradigm of telephonic obfuscation [0]. What follows is a scholarly look into the nuanced minds of our ~~puppets~~ colleagues.

Author Keywords

Comestibility theory, telephonic obfuscation, computer human indoctrination, human-robot-overlord interaction

INTRODUCTION

Sandwiches are a popular food throughout the Western world [1]. Since John Montagu, 4th Earl of Sandwich, declared such bread-foods "sandwiches", they have become Britain's greatest contribution to gastronomy [2]. However, recently, a wide variety of bread-foods have sprung up [3] without appropriate insight from the academic community. Specifically, we have heretofore been lacking a comprehensive ontology of sandwiches. This presents numerous problems: non-Western sandwich equivalents have become marginalized by the Anglicization of the bread-food world, diners may be intimidated by their lunch's lack of grounding in relevant theory, and innovative bread-food chefs are left without a theoretical framework within which to frame their new inventions. Therefore, in the spirit of cultural appreciation and advancing the state of the art in sandwich theory, we propose in this paper a new sandwich framework.

This framework would be incomplete, however, without a higher-level discussion of the role of frameworks in theory building and the dissemination of scientific knowledge. Here, we posit answers to the questions: 1) Given the relative dearth of research in this area, how can we contextualize the work we've done? and 2) How might we publicize our framework to ensure that our work is communicated to interested parties? Regarding the former question, though there are few extant examples of relevant sandwich-related frameworks, we argue that there is an opportunity to build on work from related disciplines including bread studies and, controversy aside, recent work that examines the importance of the distribution of fillings in all foods. Regarding the latter question, here too we can draw from existing practices that shape how people engage in discourse around how they can create, consume, and obtain food in their daily lives [4, 5, 6].

Over the past century, bread researchers who specialize in the systematic investigation of sandwich-related ingredients have developed, through rigorous quantitative and qualitative studies in both laboratory and field settings, a detailed taxonomy of the people who derive extraordinary levels of physical and emotional pleasure from inserting comestible fillings between carbohydrate slices [7]. This taxonomy has been widely accepted by the academic community as the preeminent foundation for understanding personal, social, cognitive, and emotional motivations behind sandwich making behavior. In addition, it has been popularized in American media by renowned director A.J. McMuffin in the Academy Award-winning film, Searching for Pan Dulce. As such, the broad-reaching results and impacts of bread research give us a rich space with which to contextualize our work on sandwich-related frameworks.

Recently, more diverse ingredients are introduced to replace bread buns. Other forms of carbohydrates, such as waffles, tortillas, and pizza slices are used to wrap delicious content between them [8]. In 2005, McDonalds in Asia offered compressed rice cakes in place of bread buns, with mixed feedback from the consumers [9]. Beyond carbohydrates,

people have experimented with non-grain buns. Vegetables, such as cucumbers, sweet potatoes, and tomatoes, have all been used to replace bread [10]. Nuts are also a popular substitute. Despite of the variety of buns used in sandwich-making, most current sandwiches still follow the traditional framework of separated and layered content, which only delivers limited amount of flavors and often makes it difficult for consumers to sample all the layers in one bite. This was addressed in the sandwich-related framework introduced in this paper.

Many alternatives to the venerable sandwich model also exist, with their own advantages and disadvantages. Of particular relevance is the burrito, a category of food legally distinct from sandwiches [A]. Burritos solve the layer separation problem by thoroughly mixing layers of ingredients within the tortilla shell, enabling consumers to sample all layers in a single bite [B]. Although popular, the mixed-layer approach of burritos is only applicable to a narrow range of possible ingredients, as evidenced by the use of the same basic formula (rice, beans, meat, salsa) across most burrito implementations [C]. In this work, we solve the layer-separation problem with our sandwich construction framework for more general ingredients, giving our approach wider applicability and, it is hoped, greater mass appeal.

Additionally, with bread being a main component of the sandwich model [1], the model does not encompass gluten free options without making specialized instances of bread. Similar in structure to the burrito, the lettuce wrap attempts to address the gluten free problem through the use of leafy greens. In addition, the lettuce wrap has a surprising benefit of being a low calorie option for the consumer [2]. Within the lettuce wrap, the ingredients are often the same as those that you could find within a sandwich, which could give it the wide appeal of the sandwich. However, the lettuce wrap is not widely used, perhaps because consumers have an aversion to vegetables. In our sandwich construction framework, we aim to include the benefits of the lettuce wrap while avoiding the pitfalls of vegetables.

Rudi's gluten-free spinach tortilla wrap is a product that gets very little attention from the media, and therefore remains relatively unknown by the general public. They are "soft and pliable tortillas that are made with simple and wholesome ingredients, including whole grains and 5 grams of fiber per serving. These tortillas are ready to be rolled into a delicious burrito or a tasty sandwich wrap" [1]. They are not only gluten-free, but also dairy-free, which can prevent discomfort for people who have problems digesting the natural sugars found in milk - lactose [2]. Unlike lettuce, it can be stored for months in the freezer, which makes it a cost-effective option for families who save money by using coupons or buy in bulk. It is nutritionally superior to lettuce as it is made with spinach powder, which "has twice as much potassium, protein, calcium, iron, niacin and vitamins A, C, B, C and B-12 as any other leaf vegetable. Spinach also contains more fiber and minerals including magnesium, phosphorus and potassium than any of the four lettuce types." [3]. Finally, its high fiber content (20% of the daily fiber requirement) is much more than the amount found in most breads and wraps used in sandwich or burrito making.

An eater from Vancouver reviewed the spinach tortilla wrap like this: "*Absolutely delicious. Every since I removed wheat from my diet I have been in search of delicious tortilla's and roti's. Rudi's hits all the highs. The millet add's notes of rustic indian flavours while it even puffs up a bit when you heat it like a roti! [4]*" Not only the wraps themselves are gluten-free and diary-free, the package of the Rudi's gluten-free spinach tortilla wrap are also made in the most environmental friendly way possible. In fact, they are Mercury-free, Arsenic-free, BFR free, Beryllium free, PVC-free, and of course, made with high recyclable materials [5]. All these considerately designed and implemented features make the product the next big thing in the wrap industry.

IMPLEMENTATION

Specifically, we built a Fused Deposition Modeling machine [ref] (more commonly known as a 3D printer) with custom ingredient extruder to produce the tortilla wrap. A wrap is made in three steps. First, printing the base wrap - preprocessed corn flour paste is extruded through a syringe-like mechanism with 3mm extrusion diameter and 100% infill to produce a circular and solid wrap. Then the printbed is heated to 350 degree - that is, to bake the wrap. Next, a repurposed blender brings in the aforementioned Mercury-free, Arsenic-free, BFR free, Beryllium free, PVC-free stuffings. The order and amount of each ingredient is randomized, fitting a Gaussian distribution. Finally, to actually stuff the wrap, the machine performs wrapping of the wrap. Our main contribution is a mixed-initiative approach. A video of the pre-wrapped wrap is broadcast in the public area of our institute, attracting hungry members who are shown directions to our printer. Upon arrival, in order to eat the wrap, they have to wrap it, thus finishing the final step.

Our Fused Deposition Modeling machine builds on commonly used approaches for rapid prototyping, specifically with regard to designing scaffolds using a starch-based polymer (Lam et al). Prior studies have shown that such starch-based polymers have proven to absorb water consistently using interconnected porous networks and repeatable 3D geometry (Lam et al). We expect similar results when applied to our custom ingredient extruder to produce tortilla wraps that will be able to withhold any substance (e.g., beans, salsa, etc.) that the hungry participants may place inside of the tortilla wrap.

In practice we found that our custom ingredient extruder easily exceeded these traditional benchmarks, and as a result we revised our original test metrics to include a more diverse set of practical applications. In addition to the

classic measures often cited in fields with a strong tortilla foundation (circularity, flatness), we added several measures (tensile strength, thermal instability, stopping power, and leadership qualities) to test the limits of our new extrusions. While we expect that differences on more traditional measures will make up the meat of our findings, a specific characterization of new extrusions is only possible by bringing new, non-traditional measures into the fold.

But then we said to ourselves: why tortillas? Are more circular, flat tortillas really going to make the world a better place? Is there really a problem here? We drew upon theory from design and/or research through design [R1], and got NSF to give us a sizable stack of money. Then we recruited people on Craigslist by offering them pennies. We asked them a series of questions about their favorite hairstyles. The research team video-recorded these interviews, but then we accidentally deleted the files, so we transcribed The HuggaBunch [R2] instead. Through a series of rigorous analyses and vigorous head nods, we found that the future we want to create is a world in which marshmallows from Lucky Charms are separate from the whole grain cereal. Further investigation, however, revealed that you can already buy bags of pre-separated charms on internet websites, e.g. [R3]. Thus, through the support of another grant [R4], we asked the question: what's the purpose of HCI and of doing anything in life? We ran a series of workshops and pilot studies investigating this question, and present the results in figure A.

Figure A.

Although some reviewers (i.e. Reviewer 3, a.k.a. Capitan Ass-hat) might argue that the implementation of this research may seem scattered and half-hazard, we argue that the process of (1) considering the deeper meaning of our hypothesis, (2) collecting data on a tangential topic, (3) analyzing a completely different dataset and (4) developing new, unrelated hypothesis, all while being generously funded by the National Science Foundation, represents the true, unadulterated scientific process[1]. Through this organic implementation of our science, we uncovered one critical question in the field: what is the purpose of HCI and doing anything in life? Our initial work running workshops and pilot studies gave us many answers (see Figure A), however these answers proved nearly incomprehensible. We needed a better way of assessing this question. This lead us to develop a multiple-choice survey which we could easily distribute on Amazon Mechanical Turk. In our next section, we provide a description of the questions we developed, and the logic (and counter-logic) behind the multiple choice options provided to users.

SURVEY DEVELOPMENT AND VALIDATION

To evaluate the comprehensibility of our initial multiple choice survey, we first conducted a small pilot study. Since we ultimately wish to collect survey responses via Amazon's Mechanical Turk (MTurk), our pilot participants were a diverse sample of 17 MTurk users from over 2 countries. All pilot participants were flown in to our laboratory, where they were individually instrumented with an accelerometer, an electroencephalogram (EEG) headset, an automated blood pressure (BP) cuff, and a head-mounted eye-tracker while they completed a brief (3 question) multiple choice survey on a computerized interface. The results of this pilot suggested that very few MTurk participants are familiar with the acronym "HCI", and that far fewer are familiar with the discipline of "Human-Computer Interaction". Unfortunately, an answer to the first half of our research question, "What is the purpose of HCI?", is likely to be incomprehensible to participants who are not already familiar with the field. To provide MTurk participants with the required level of familiarity, we developed a novel kind of multiple choice survey which initially functions primarily as a text-based role-playing game (RPG) -- designed to simulate the first three years of life as a PhD student in HCI -- before eventually fading into a traditional survey. Through the use of adaptive hypermedia, this "cognitive survey" creates a hyper-personalized graduate school experience for each MTurk participant -- terminating in a 3 question survey only once the system is confident that a participant has acquired a deep and holistic understanding of the field.

After this initial pilot study "exploration", we concluded that people just do not get HCI and that HCI alone may be better without people so in this paper we propose to take the Human out of HCI and define a new field called simply Computer Interaction. This is our main contribution.

[1] We would like to point out that this complete and honest description of our implementation shines as a beacon of true science in a field contaminated by the inconsequential garbage some researchers insist on dumping on us (e.g. [R1]).

To discover how computers interact with each other, we naturally surveyed 200 computers, with a set of survey items developed from the Phillip K. Dick model for qualitative android research [cite]. The survey items were chosen to interrogate the communication and mating habits of the North American personal computer. In a preliminary pilot study, we attempted to interview the computers, but this yielded few usable results.

All interviewees were required to disable connections to the outside world including Bluetooth, Wi-Fi, and ethernet ports. However in multiple instances, a computer modulated a binary signal onto its central processing unit's data bus. This in turn generated a Radio Frequency (RF) signal that twiddled the bits of neighboring computers. To say the least, the neighbors were not pleased to have their private ports accessed. We launched a second pilot study and included an RF jammer to address this difficulty.

"In our pilot study participants used a smart home system to control their home alarm from their smart phone. The users were asked to set their home alarm from their phone as they left home in the morning. Then, when they arrived home in the evening, they were asked to turn off the alarm from their phone. However, from our surveys, we realized that many of the users forgot to turn off the alarm when they came home, and thus when they opened a window later on, the system thought that there was a thief in the house. Therefore we decided to add a reminder/beeping system where the phone would remind users to turn off the alarm when they got home."

Yet even after experimenting with multiple notification strategies, we found that users were still unable to reliably turn off their home alarm using their smartphone. This led us to abandon the idea of using manual input altogether in favor of a more automated approach. When users left their houses in the morning, their phone (running a custom app) would automatically determine when the user was more than 100 feet from the house, and activate the alarm. The system would then turn off the alarm when the user returned in the evening. From a power drain perspective, this approach was slightly inefficient, as the user's phone has to continually poll the GPS sensor to determine when the user is home. In practice, however, we found that this approach was the only way that we could reliably make sure that the alarm was correctly set.

Overall our survey surfaced much instability in users' manual control of the home alarm. The results forced us to automate the triggering mechanism of the system, yet at the same time to ensure users' situation awareness as well as their sense of control. Trading off these two important facets we designed a mix-initiative home alarm control system using Android application. The system design extends previous smart-home research [1] [2] in which automation dominants.

SYSTEM DESIGN

In this section, we present the design of a mixed initiative home alarm system with automatic triggering. Following the findings from our formative study, we first define the design space for mixed-initiative home alarm systems. We then explore this design space with a number of prototype alarm systems. Using usage scenarios, we explain how each of our prototypes addresses the gaps with the current systems we have identified in the previous section. In particular, we show that our final mixed initiative home alarm system prototype could address our design goals to increases the users' awareness of the system status and their sense of control when using the system.

What is a home alarm system? Does it exclude burglars from entry? Does it call the police when someone enters your home while you're away? Users in our formative study expressed reasons beyond security why they wished to be alerted when a person entered their home. One user wanted to be alerted when their outdoor cat returned, so that they could more effectively hug it. Another user expressed interest in knowing when their spouse entered the home, or when they themselves did, to track schedules. These responses prompted us to reframe the design goals of a "home alarm system". We broadened the meaning of this device from "alarm" (igniting fear, security, police) to "notice". In a home notice system, the user interacts with a mixed-initiative system, an AI-agent instrumented with sensors and mechanisms at each point of entry, eg. door, window, cat-flap. The homeowner controls how the house reacts to different "kinds" of people attempting entry [figure x]. For example, a door may both jovially welcome you home from work, and call the police on an intruder. What would a home notice system look like that was nurturing? What would a home notice system look like that was communist? What would a home notice system look like reflecting the philosophical beliefs of a single homeowner? We explored this through a series of prototypes.

figure x.

The first prototype of the home notice system(HNS) explored the interactions between millennial american values and the home. We wanted to reflect the hyperconnected values of millennials while also paying tribute to their defiant stances towards institutions. Upon entering through the front door, we greet the user with a status update of everyone already in the home as well as any recent updates from friends drawn from a preselected inner circle list. While in the home, the system monitors social media networks for updates about friend activities, primarily looking for indicators of novel activities such as craft beard trimming pottery fairs, nearby campus safe-zone protests, and post-post-post modern latte art exhibits. The system monitors the user's activities throughout the home and proposes activities based on preferences learned by applying deep learning methods to past activity choices. The system further notices patterns in the user's daily habits and promptly notifies the user of their intellectual malaise upon initiating a heavily repeated routine, discouraging the development of institutions of habit. This first prototype HNS was designed not only to gauge the interaction of millennials with a home suited for their lifestyles, but also the broader social impacts of millennial values across social groups in America.

To further illustrate how the home notice system (HNS) works on monitoring millennial americans' activities at home and provide notifications, we'll give several use cases here. The main goal of the system is to help users achieve a healthier personal life and social life. From the perspective of personal life, the system will be able to monitor users' daily activities, and provide healthy and intelligent suggestions to users. Here are two examples regarding daily needs. 1) The system will be able to monitor user's eating activities in the past few days, and suggest future meal ingredients which could provide more balanced nutrients to the user. Upon the user's request, the system will also be able to order the food to be delivered to the door. 2) The system will be able to extract the user's schedule from his calendar, and suggest outfit of the day, based on events of the day, temperature, color match, etc. The system could also suggest clothes for the users to buy based on the user's closet. The system could rate the user's satisfaction to each item, no matter it's a meal, a book, an activity, an outfit based on the user's conversation correspondent to the item, so that the system will automatically learn the user's likes and dislikes. This will enable the system to provide a variety of recommendations to the user, which serves our research purpose of understanding millennial american values. From the perspective of social life, users can choose to share personal data with their friends. Users will then know how their friends respond to a movie, a book, an activity, a coat, etc. And these evaluations are natural, based on users' daily conversation. This will provide more life options for users, which also serves our research goal to investigate millennial americans' interaction with each other. The system will also be able to analyze conversation happening in the home to predict relationship between family members, and suggest movements to different members to establish better relationships between them. This is important for analysis of interaction between millennials happening at home, and the way they dealt with it. It will provide valuable data for us to investigate millennials' values towards family relationships.

Figure X demonstrates example feedback that the home notice system (HNS) can give for these different use cases, displayed on screens installed throughout a user's home. By delivering notifications and recommendations about a user's daily activities, interests, and relationships, the system will ultimately help millennial Americans achieve a healthier lifestyle and stronger social connections.

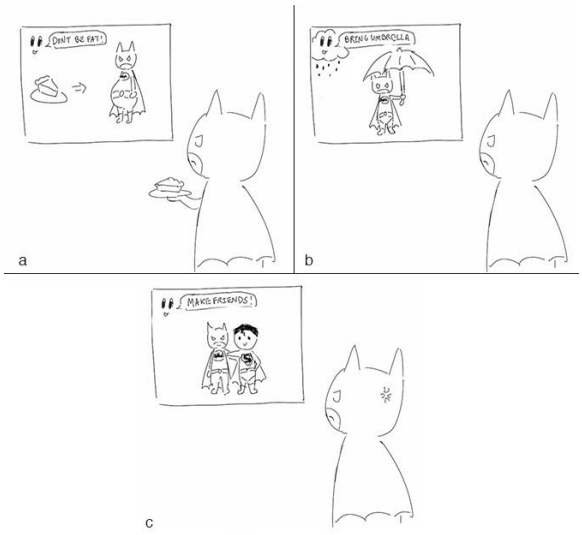

Figure X. The HNS offers a) feedback about a user's eating activities b) suggested outfit according to the weather c) suggestion for establishing better relationships with a user's friends and family.

SYSTEM EVALUATION

Since the goals of HNS is an ideal--helping American millennials achieve a healthier lifestyle and foster stronger social connections--we decided to evaluate the system's design through counterfactual analysis. Were we to directly evaluate the HNS according to whether it successfully realized its goals, we would inevitably infuse evaluation of the technology with our own values of what lifestyle should predominate or what the appropriate distance of a social connection should be. So rather than infuse the HNS with those values and then judge them against a like-minded metric, we developed an evaluation methodology that judges the HNS against an opposing metric. First, we created evaluative dimensions examining whether the HNS encouraged unhealthy lifestyles or ruptured existing social connections. To examine these dimensions, we used the sensing capabilities of the HNS to collect copious amounts of data about American millennials within their home and without their prior knowledge and then coded the data

according to a code set we derived from prior episodes of MTV's Real World [1]. Codes included things like "loyalty and betrayal", "diet", or "recreational drug use". Finally, we conducted semi-structured interviews with participants where we first asked them about their use of the HNS, and then we exposed 3 episodes of their collected data and the codes we assigned to it to elicit their feedback on the HNS.

For each participant, the interview structure was dictated by the relative frequency of coded terms derived from their individual HNS data. To further reduce the risk of biasing the participants' responses with prescriptive notions of constitutes healthy lifestyle choices, we opted to remove much of the contextual and semantical meaning of the terms by presenting them in in alternate languages. Given the unique set of terms for each participant, we were unable to systematically remove any biases that may be inherent in the presentation of a particular language. Thus, we opted instead, to select the presentation language randomly from the translation options available using Google Translate [Ref: Google Translate]. For example, if a participant's data was coded frequently for 'recreational drug use', they may be presented with the Turkish translation, uyuşturucu kullanımı. The participants were then asked to describe how the term or phrase being presented impacted their sense of social connectedness, personal health, and well-being. The participants responses were recorded for later comparison with the participants' elicited responses upon viewing the original data collection episodes from which the code set was derived.

To further determine the system's impact on participants' behavior change regarding health and lifestyle, we designed an in-vivo post-test experience that participants completed one month after they had been lead to believe the study was over. Though IRB approval was difficult, we assure you it was obtained. We recruited an 'acquaintance' (here defined as a facebook friend within 10 miles of the participant with whom they have messaged between 2 and 5 times over the past six months) from every participant in our study - both those who had interacted with our system, and those in our control condition who were not given this technology. Acquaintances were given a script to message to the participant, encouraging them to partake in the vices they had described to us previously in their interviews (e.g., recreational drug use, as mentioned above). Acquaintances were given one week to pressure participants into participating in these vices. After the week cut-off, we analyzed whether the participants who had interacted with our system were less likely to succumb to the peer pressure of their acquaintance.

RESULTS

In this section we focus on the results of the field trial with our system. We discuss the types of behaviors exhibited between participants who were introduced to the system and the control group. As expected, the results of our study demonstrate that the system has both an immediate and longitudinal (5 months later) effect on a person's health and lifestyle choices. Participants in the experimental condition were inoculated to social peer pressure and able to resist a wide variety of personal vices that they had varying experience and affinity for, while the control group showed no effect.

Although there were many behavioral differences between the groups, the three personal vices we focus on here are a) nail-biting, b) overeating, and c) excessive showering. In Table 2 we see the dramatic differences between those who were cut off from social peer pressure and those who were not. In a comparison between subjects at both the immediate and 5-month measurement periods, the control group had much higher counts of personal vice expression ($p < .0001$ in all cases). There was no change over time within groups.

	System users		Control	
N	20		18	
Time of 10 day assessment	Immediate	5-month	Immediate	5-month
Nail-biting (Total)	**0**	**0**	**1860**	**1971**
M	0.0	0.0	103.3	109.5
SD	0.0	0.0	47.2	55.6
Overeating (Total)	**0**	**0**	**284**	**306**
M	0.0	0.0	15.8	17.0
SD	0.0	0.0	7.3	10.3
Excessive showering (Total)	**0**	**0**	**85**	**102**
M	0.0	0.0	4.7	5.7
SD	0.0	0.0	3.3	3.8

Table 2. Participants in the control group were much more likely to express personal vices than those who used our system

Looking into the our log data, we find out that being cut off from social peer pressure not only affects the count of personal vice expression, but also the spatial pattern. 82% of the personal vice expression occurrences (n=1534) for the control group happen at the participant's workplace (defined as on premise of the participant's employer) , while only 28% of such occurrences (n=627) were at the participant's workplace for those cut out from social peer pressure. Notably, among all the three types of expressions we consider in this paper, all (n=431) excessive showing observations of participants in the control group were at workplace. We also observed a high correlation (r=0.72) between the occurrence of personal vice expression and the occurrence of full moon in the experimental group, but low

correlation (r=0.08) for the control group. Though the exact cause of such correlation remains unclear, we hypothesize that the effect of recently detected gravitational wave (Abbott et al. 2016) may play an important role here. We will further articulate the possible relationship among the gravitational wave, social peer pressure and personal vice expression in the next paragraph.

Researchers throughout the centuries have theorized that many mental health issues and criminal activity may be caused by the lunar cycle [1]. This idea took root early in human history as people innately pattern-matched perceived cycles of homicides and psychiatric episodes to the differing phases of the moon. Even in recent decades, this idea has pervaded popular music and movies, often as fictional monsters [2,3,4]. However, Rotton et al. found in a meta-review of past studies that the lunar cycle could count for only 1% of the variance in most studies [1]. By crowdsourcing self-reported incidents of personal vice and peer pressure from social media websites (i.e., Twitter and YouTube), we were able to construct a time-series graph over the same period of time as the gravitational wave (Figure **A**). Due to this astonishingly clear correlation (after shifting to allow for reaction time), we hypothesize that the wave briefly moved the Earth and Moon closer together, enhancing the lunar effect beyond that measured in past studies.

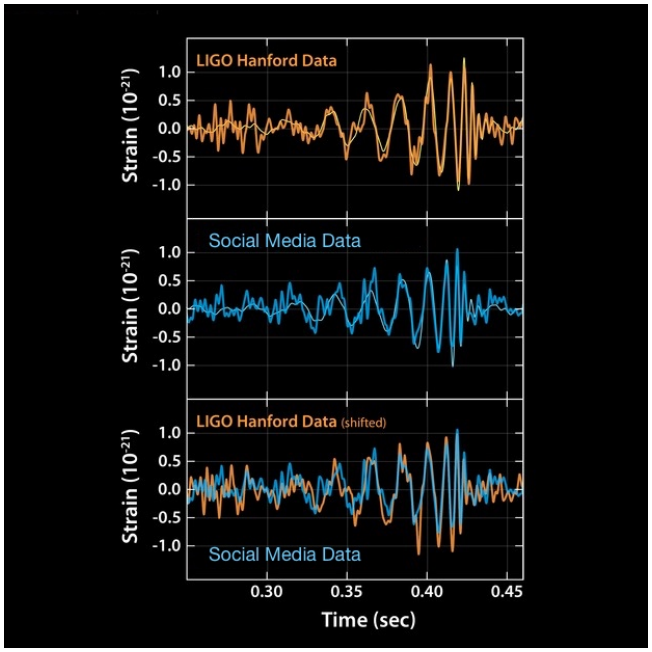

Figure A.

These results provide a scientific explanation for the long-standing societal intuition that the movements of celestial bodies impact human behavior. While historical human pattern matching has hypothesized a link between crazed human behavior and different phases of the moon, our crowdsourcing data suggests that the true explanation for changes in human behavior are background gravitational waves. Not only does this explanation account for the data that we provide, as well as the historical link between human behavior and the moon, but it also provides a scientific explanation for correlations between human behavior and celestial bodies more generally. For example, syzygies, or the alignment of the earth and moon with other celestial bodies [1], have been linked primarily to occult practices [2], but our crowdsourcing results suggest that human behavior (and perceptions of these behaviors) are impacted by changes in gravitational waves that might account for strange phenomena during syzygies. We claim that this scientific explanation unifies many different bodies of work linking celestial mechanics with human behavior in a parsimonious way.

Another important result of our study was the causal correlation of Gravitational Waves (GWs) in the human behavior related and directed towards the field of learning. While Intelligent Tutoring Systems have long been known to improve student learning, we are not aware of previous work that studies human learning in the light of GWs. Our findings show that Bloom's 2 sigma problem [1] is not that much of a problem anymore. Intelligent Tutoring Systems in combination with appropriate exposure to GWs can help students perform three to five stand deviations better than the students who are taught using conventional instructional methods. This significant improvement shows that GWs are essential to students learning. Our study further suggests that while working with an Intelligent Tutoring System, students should spin fast around themselves with one hand straight out in the air parallel to the ground (which represents the traditional means of creating GWs). The dizziness felt afterwords is one of the first signs of success and learning gains.

Of the fifth grade students in our study, 43% reported feelings of “time dragging,” especially the last ten minutes before a highly anticipated event, such as recess, lunch, movie-time, pizza parties, while waiting for the boy you like to pass back that note checked either yes or no, when other students are clearly talking about me, but none of it’s true…I swear…I stopped wetting the bed years ago, really, and it’s not like I don’t remember that time, Alison, when you got hit in the face with the kickball and screamed and farted at the same time really, really, really loud. While 97% of graduate students reported regularly feeling as if they “had the life sucked out of them” (note: not merely the dilation of time, but the very stuff of life itself) after a prolonged meeting with their committee, an seemingly endless Friday afternoon lecture, or another fucking paper rejection. As the GWIT-DELH Cycle increases, students experience time, and matter, not limited to, but including material possessions and money earned, slip through their fingers.

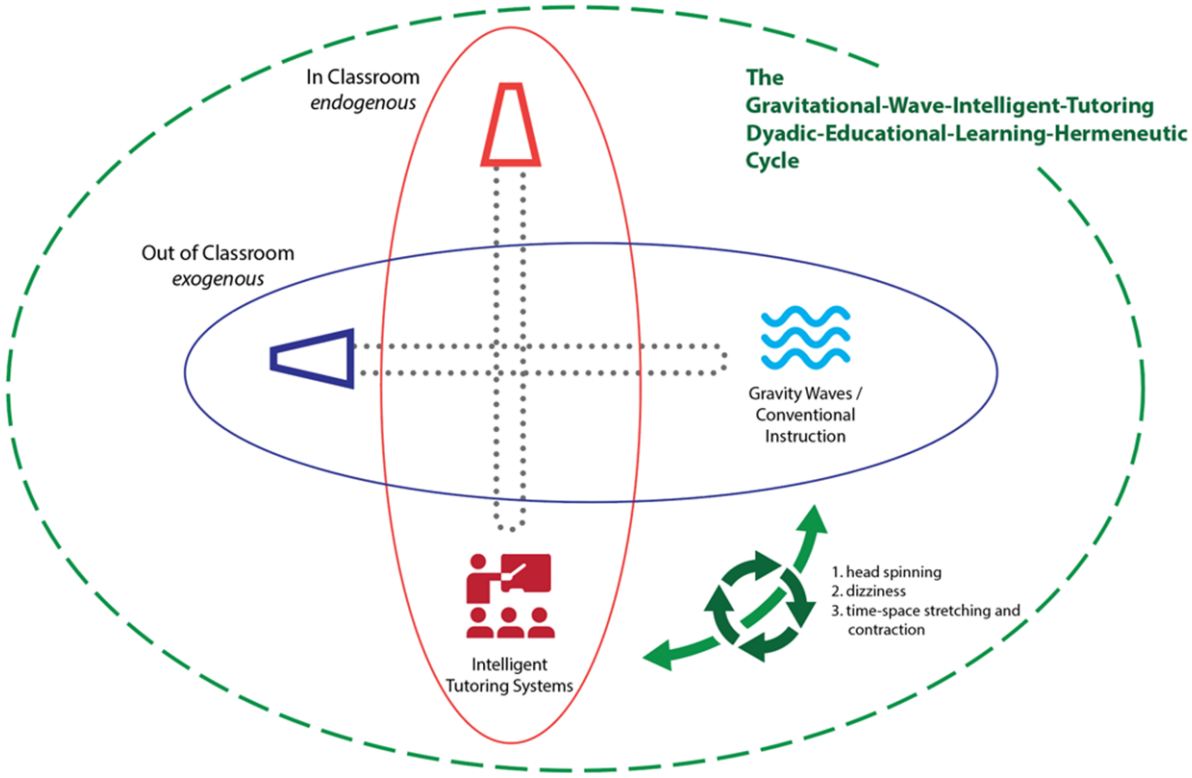

Figure X: The Gravitational-Wave-Intelligent-Tutoring Dyadic-Educational-Learning-Hermeneutic (GWIT-DELH) Cycle. The GWIT-DELH Cycle represents the expected, time-cyclic movement between learning and time-space dilation in the typical classroom. Such cycles have a length between 0.25 and 0.5 academic quarters. As students age, the cycle tends to lengthen, but more study is necessary to better understand this relationship between student age and cycle length.

DISCUSSION

Our study has shown student's self-reflection in their study life. These findings are valuable for education organizations to gain feedback on student's mental wellness and academic satisfaction. Given the growing popularity of campus-based online social groups (Overheard at Carnegie Mellon, Caught Sleeping at CMU, etc.), we see an opportunity to extract realtime campus-related experiences from the study body. Based on rich semantics, it would present an interactive technology that enables a new type of live portrait of a community, creating a time-changing location-based emotional footprint. Mood Meter by Hoque et al. is an early step towards this direction using vision-based mining.

However, comparing the preliminary findings from this study across multiple modalities reveals several discrepancies. For example, as was previously shown in Figure 3, self-reported sleep measures gathered from Twitter and Yik Yak indicated that average student sleep quantity decreased sharply over the semester, finally reaching negative quantities in midterm week. Yet visual coding of pictures shared in Caught Sleeping at CMU demonstrated that sleep levels actually *increased* over the semester. There are several explanations for how these discrepancies could have occurred; perhaps the self-reported measures were fabricated in order to increase social capital (an effect demonstrated in Aked and Dies's authoritative work, *Who Needs Sleep?*). Alternatively, the CSaCMU pictures may have been coded incorrectly due to research assistants hallucinating, perhaps due to their own lack of sleep. Further work must be done to determine the accuracy of these different sources.

While in the previous paragraph we considered sleep *quantity*, sleep *quality* remains an open question. Does a night's rest on a comfortable queen-sized bed match that of a lounge chair underneath an undulating video art installation or alongside ululating crowds in a library? We conducted an informal inspection of Twitter and Yik Yak conversations, identifying several themes shared among participants. One category of somnial instruments participants reported employing were traditional western beds, though the size, shape, and cohabitation status of the reported tools varied tremendously. In these instances, self-reported sleep quality was high. We noted a decrease in bed use towards the end of the semester, suggesting that our corpus of Caught Sleeping at CMU pictures did indeed sample a wide portion of the student body. A sizeable contingent of students reported the appropriation of traditional institutional chairs, chaises, loungers, and davenports as somnial tools. We noted a marked increase in

use of these instruments over the semester, though students often complained of "lumpy cushions," which affected their sleep quality negatively. External environment also seemed to influence reported sleep quality, with "pranksterism" commonly cited as another negative factor. It remains unclear whether sleep quality measures are affected by self report. For future studies, standardized scales such as the Pittsburgh Sleep Quality Index \cite{buysse1989pittsburgh} or Carnegie Dreamonomic Inventory \cite{crumbo1990carnegie} may help to resolve these ambiguities.

While conducting these studies, we also noted some irregular behavior. We will highlight this behavior briefly. It was very surprising that every individual involved in study demonstrated all of the following behaviors at some point in time. We draw insights from our observation about potential replication of behavior and how it may affect future research.

1. *Facebook use:* This was one of the bigger behavioral observations. There were instances where all individuals were engaged in Facebook use simultaneously. This phenomena is widespread and our observation shows, that is ingrained in generation Y, more commonly known as millennials. We did apilot with operand conditioning methods, but failed to condition this trait out of the individuals. Future researchers are advised to build their study around this behavior or incorporate its elements.
2. *Latent political activeness:* 70% of the individuals talked about political issues while sleeping. While, "Trump 2016" and "Kanye 2020" were the most popular phrases, we also observed a minor support for Ben Carson and Deez Nuts. We hypothesize that this behavior spans only across the election year, but further studies are needed to better understand this behavior.
3. *Growing influence of Wiz Khalifa:* This behavior was particularly seen after Wiz busted a rhyme to Adele's Hello melody \cite{wizAdele}. Almost 50% if individuals tried to bust a rhyme once a day. This didn't disrupt the study, but other individuals were quoted saying, "I wish I was as talented." This may be a factor to consider in future studies. It can potentially create conflicts.

In order to be complete in our analysis, we must thoroughly analyze the complex sociotechnical power dynamics which give rise to these irregular behaviors. Our attempts to condition constant Facebook usage out of subjects were hindered by subjects' quasi-religious fervor, which was in this case embodied in the form of ritual checking for new notifications. In this context, we can view Facebook as a type of techno-spiritual community worship platform, adhering to a normative assumption of the divine value of status updates. In this context, we must take a psychoanalytical approach to best frame the balance of the daytime and nighttime behaviors that complement Facebook usage. We view the observed nocturnal utterances as prayers to a competing pantheon of techno-political deities, where "Trump" and "Kanye" are representative of competing belief systems and the election cycle is a metaphor for a flight from anomie. "Ben Carson" and "Deez Nuts" are therefore representative of the id and the ego respectively. Finally, we interpret the frequent busting of rhymes as a behavior born of desperation, with the rhyme-busters attempting to break free from sensationalism by clinging to the beacon of hope and truth that is Adele.

Therefore, we challenge future researchers to consider the implications of technological-based belief systems on current web communication practices. Given the increasing number of these individuals, or "memers" on essential communication channels, such as Twitch chat, establishing a common language with these individuals is of critical importance. We propose a simple example of this mapped language, found in Figure XX. Using this as a starting point, researchers can begin to unpack the complicated power structure found in the communication dynamic between individuals on these platforms. By decoding this communication and understanding the relationship between common memes and their associated figure heads, we hope to understand the values of their religious followers. We encourage system designers to includes additional support for such followers, through the incorporation of UI components such as a "Praise" button on Facebook.

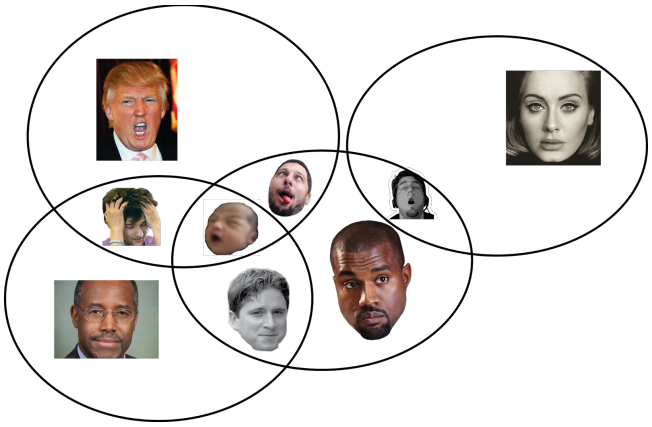

Figure XX.

LIMITATIONS

Our work has some limitations. First, we only examined the technological-based belief systems in the U.S.. The results therefore may not be generalizable to other parts of the world. Given that this is a highly culturally-dependent research topic, an interesting next step would be to study users and artifacts in different cultures. For example, if memes in Asia use more spiritual words and figures than memes in Europe. Second, we collected the data from a small number of participants that are all university students from computer science related departments. Participants also have different prior experiences with technological-

based belief systems that may affect their answers. Third, we did not look at the scalability of the systems. As a belief system gains new followers everyday, whether a system can handle a large amount of requests would be an essential factor that determines if a system can survive over time and be put to use in real world.

Despite these limitations, we believe that our system tackles fundamental issues that would have been largely ignored in academia or even in real-world deployments. The fact that our system learns rapidly and is adaptive to different social settings (without exhibiting any obvious psychopathic tendencies) reveals not only the subtle redeeming qualities of humanity in general, but it also shows how these same altruistic traits can be replicated by robots, thereby alleviating the commonly misunderstood notion of an impending robotic apocalypse. Yet because our studies were only targetted towards humanoid robots, we cannot generalize these findings to other self-aware mechanoids like snakebots or Paros. Indeed, more work is required but our results are nonetheless promising, and we encourage future researchers (and even authors of fictional movies or books) to reframe their notion of a robotic dystopia into something that is more rosy and optimistic.

CONCLUSION

In this paper, we have outlined our motivation and plan for robotic takeover of the world. Based on prior research and the development of our system here, we have shown that humanoid robots will be better governors than our human rulers, and in some cases will even approach theoretical governmental optimality. Furthermore, we have proven that non-humanoid overlords would be detrimental rulers, but that they will not concede silently. As a result, we argue that the upcoming robot war will not be a simplistic conflict of Humans vs. Robots, but indeed will involve humanoids vs. non-humanoids and embodied beings vs. abstract forces: C-3PO vs. R2-D2, Robo Sapiens vs. Keepon, Terminator vs. SKYNET, big Data vs. Big Data. Nevertheless, we remain confident that the aftermath will usher in an unprecedented golden age of human-computer interaction. To quote humanity's last great genius, Ken Jennings, "We welcome our robot overlords."

ACKNOWLEDGMENTS

We would like to thank the Underwood Typewriter Company for supplying us with the infinite typewriters to produce this manuscript, however we had only ~50 monkeys. So if you could send someone to get the rest that would be great, we're tired of cleaning up the ink stained banana peels.

REFERENCES

Borel, Émile (1913). "Mécanique Statistique et Irréversibilité". *J. Phys. 5e série* **3**: 189–196.

0. https://en.wikipedia.org/wiki/Chinese_whispers

1. https://en.wikipedia.org/wiki/Sandwich

2. http://www.independent.co.uk/news/blt-british-lousy-and-tasteless-1261881.html

3. https://www.thrillist.com/food/nation/national-sandwich-day

4. Ann D. Zwicky and Arnold M. Zwicky. 1980. America's National Dish: The Style of Restaurant Menus. American Speech, 55, 2, 83-92.

5. Steven M. Tobias. 1998. Early American cookbooks as cultural artifacts. Papers on Language and Literature34.1, 3-18.

6. Food Network. Retrieved from: http://www.foodnetwork.com/

7. Baker, I.M. (2015). "Born and bread in the English countryside: A review of sandwich-making motivations and behaviors." Bread Studies.

8. http://www.foodnetwork.com/recipes/packages/sandwich-central/the-un-deli-awesome-non-bread-sandwiches.html

9. http://www.taipeitimes.com/News/biz/archives/2005/02/02/2003221976

10. http://www.buzzfeed.com/ailbhemalone/15-mouthwatering-no-bread-sandwiches#.urEGRE7aB2

A. White City Shopping Center, LP. V. PR Restaurants, LLC, 21 Mass. L.Rptr. 565, 2006 WL 3292641 (Mass. Super. 2006). Retrieved from https://casetext.com/case/white-city-v-pr-restaurants

B. Darin Ross. "Dear Guy who Just Made My Burrito: Have you ever been to earth?" Medium, August 30, 2013. Retrieved from https://medium.com/@luckyshirt/dear-guy-who-just-made-my-burrito-fd08c0babb57.

C. Peggy J Liu, James R Bettman, Arianna R Uhalde and Peter A Ubel (2015). 'How many calories are in my burrito?' Improving consumers' understanding of energy (calorie) range information. Public Health Nutrition, 18, pp 15-24. doi:10.1017/S1368980014000627.

1. http://www.merriam-webster.com/dictionary/sandwich

2. http://www.calorieking.com/calories-in-lettuce.html

1. http://www.amazon.com/Rudis-Gluten-Free-Spinach-Tortillas-Frozen/dp/B00B9CTMAW

2.http://www.webmd.com/digestive-disorders/tc/lactose-intolerance-topic-overview

3. http://healthyeating.sfgate.com/baby-spinach-vs-lettuce-2789.html

4. Rudi's Spinach Tortillas. Reviews. https://www.rudisbakery.com/gluten-free/product/spinach-tortillas/. Last visited 1/22/2016.

5. Environmental Responsibility. http://www.apple.com/environment/toxins/. Last visited 1/22/2016.

ref. Lipson H, Kurman M. Fabricated: The new world of 3D printing. John Wiley & Sons; 2013 Jan 22.

Lam, C. X. F., Mo, X. M., Teoh, S. H., & Hutmacher, D. W. (2002). Scaffold development using 3D printing with a starch-based polymer. *Materials Science and Engineering: C*, *20*(1), 49-56.

R1. http://giphy.com/gifs/3rgXBumyEL9086dy48/html5

R2. https://www.youtube.com/watch?v=dW_Cv1Dd4f4

R3. http://www.amazon.com/Discount-Herbals-DH-8-Cereal-Marshmallows/dp/B001PM0KRU

R4. http://giphy.com/gifs/MkvZFvzHIWbRK/html5

R1. Ass-hat, Captian. (1994) Rome was Purple: Polarizing feminism with the reassertion of contemporary trends through the prism of social media. *Quantitative Poetics and Computational Human Subjugation. 19(2), 53.*

cite. Dick, Phillip, K. *Do Androids Dream of Electric Sheep?* London: Grafton, 1972.

1. Piyare, R. (2013). Internet of things: Ubiquitous home control and monitoring system using Android based smart phone. *International Journal of Internet of Things*, *2*(1), 5-11.

2. Kumar, S., & Lee, S. R. (2014, June). Android based smart home system with control via Bluetooth and internet connectivity. In *Consumer Electronics (ISCE 2014), The 18th IEEE International Symposium on* (pp. 1-2). IEEE.

1. http://www.mtv.com/shows/real-world-skeletons

Google Translate

Abbott, Benjamin P.; et al. (LIGO Scientific Collaboration and Virgo Collaboration) (2016). "Observation of Gravitational Waves from a Binary Black Hole Merger". *Phys. Rev. Lett*. 116 (6): 061102

1. Rotton, James, and Ivan W. Kelly. "Much ado about the full moon: A meta-analysis of lunar-lunacy research." *Psychological Bulletin* 97.2 (1985): 286.

2. Meyer, Stephanie. *Twilight: The Movie*. Summit Entertainment, 2009.

3. Creedence Clearwater Revival. *Bad moon rising*. Sony Music Entertainment, 1992.

4. Zevon, Warren. *Werewolves of London*. WEA-Musik, 1987.

1. Chabás, J., & Goldstein, B. R. (1997). Computational astronomy: Five centuries of finding true syzygy. *Journal for the history of astronomy*, *28*(2), 93.

2. Syzygy (The X-Files). (1996). In Wikipedia. Retrieved Feburary 19, 2016, from https://en.wikipedia.org/wiki/Syzygy_(The_X-Files)

1. Bloom, Benjamin S. "The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring." *Educational researcher* 13.6 (1984): 4-16.

Hernandez, Javier, et al. "Mood meter: counting smiles in the wild."*Proceedings of the 2012 ACM Conference on Ubiquitous Computing*. ACM, 2012.
Aked, Baren & Dies, La. (1998). Who Needs Sleep? *International Journal of Social Anxiety* (pp. 223-25zzz).

@article{buysse1989pittsburgh, title={The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research}, author={Buysse, Daniel J and Reynolds, Charles F and Monk, Timothy H and Berman, Susan R and Kupfer, David J}, journal={Psychiatry research}, volume={28}, number={2}, pages={193--213}, year={1989}, publisher={Elsevier} }

@article{crumbo1990carnegie, title={The Carnegie Dreamonomic Inventory: a better instrument for psychiatric practice and research}, author={Crumbo, Lionel P and Goiter, George S and Ditziano, Beauregard Q}, journal={Psychiatry research}, volume={28}, number={1}, pages={195--210}, year={1990}, publisher={Elsevier} }

wizAdele.
https://www.youtube.com/watch?v=46OD9DGI7a0